

The Use of Reformulated Gasoline in Aircrafts Certified to Operate on Automotive Gasoline (DAI Informational Document # 970501, May 1997)

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Manufacturers of aircraft and aircraft engines specify the use of aviation gasoline meeting ASTM D 910 "Standard Specification for Aviation Gasoline". However there is a process whereby aircraft/engine combinations can be certified to operate on automotive gasoline. The process involves numerous hours of testing, first of the engine and secondly, of each aircraft/engine configuration for which certification is sought. Once the tests are successfully completed the Federal Aviation Administration issues a "Supplemental Type Certificate" (STC) certifying the aircraft to operate on certain automotive gasolines. Not all gasoline is approved for use under the STC. The gasoline used must meet ASTM D 4814 "Standard Specification for Automotive Spark Ignition Engine Fuel" (formerly ASTM D 439).

In addition the gasoline cannot contain any alcohols. There are a few planes that have received STCs to operate on pure ethanol and, in fact, transoceanic flights have been completed on ethanol. However the testing to secure STCs for automotive gasoline has been done on gasolines that do not contain ethanol or other alcohols. Consequently, while there may be no major problems with these fuels, evidence of their suitability for aviation use is lacking. Due to these open issues and unanswered questions, automotive gasolines, whether reformulated or conventional, that contain alcohols cannot be used in aviation applications.

Reformulated or conventional gasolines containing methyl tertiary butyl ether (MTBE) are approved for use in STC certified aircraft. In December 1992, the Small Aircraft Directorate of the FAA issued guidance on gasolines containing MTBE which in part stated:

"Research testing conducted at the FAA Technical center, with autogas blended with MTBE

have not shown any safety related problems. Materials compatibility and performance data supplied by the Experimental Aircraft Association and Petersen Aviation, the main holders of autogas STCs, also have not shown any safety related problems with autogas blended with MTBE. FAA service difficulty reports do not reveal any materials compatibility or safety issues. The majority of the future fuel blends being developed as part of the American Society for Testing and Materials (ASTM) task force programs have included MTBE as an additive. Accordingly, the FAA has determined that autogas blended with MTBE can be used safely in aircraft that are approved for the use of autogas by STCs."

"The existing prohibition on the use of alcohol additives remains in effect. It is the operators responsibility to assure that the autogas conforms to ASTM Specification D 4814, or the predecessor Specification D 439."

"Autogas blended with MTBE is approved for use in aircraft that are approved for the use of autogas by STCs. AC 23.1521-1A is being revised to remove the prohibition on MTBE additives."

Based on the above advisory, if you operate your small aircraft on automotive gasoline in an area that offers only oxygenated or reformulated gasolines, you should be sure you are selecting a gasoline that contains MTBE at least until such time that the FAA issues guidance permitting the use of automotive gasoline containing ethanol.

There are other considerations about which aircraft owners/operators should be aware. First, the incentive to secure an STC for aircraft is prima-

rily the economic incentive for lower fuel costs and sometimes lower maintenance costs than experienced with aviation gasoline (Avgas). However nearly all oil companies and many light aircraft airframe and engine manufacturers do not recommend the use of automotive gasoline in any light aircraft. This is primarily because aviation gasoline undergoes more extensive testing and quality control measures than does automotive gasoline. Furthermore, the characteristics of aviation gasoline are controlled to a tighter specification range than automotive gasoline. For instance, automotive gasoline has a broader boiling range and is more volatile than Avgas. It also has a shorter shelf life (less stability) than aviation gasoline. Finally, it should be noted that since January 1, 1995,

federal regulations have required that all automotive gasoline contain detergents/deposit control additives. While these additives have been thoroughly tested on automotive engines, they have not been extensively tested in air-cooled aircraft engines.

Aircraft owner/operators should consider the above issues when choosing between aviation gasoline and automotive gasoline for their STC certified aircraft. If automotive gasoline is selected, a determination should be made as to whether or not it is oxygenated (contains alcohols or ethers). If the gasoline contains oxygenates, it should be kept in mind that MTBE is the only oxygenate that has been included in the STCs per guidance from the Federal Aviation Administration.

The information contained in this document is based on a limited number of technical papers, test reports, and information sources. While presented in a condensed form, Downstream Alternatives Inc. has made every attempt to represent the information as accurately as possible, and it is believed to be accurate as of the date of printing.